



LONG TERM PAVEMENT PERFORMANCE

North Central Region

1983 Sloan Place, Suite 10, St. Paul, MN 55117

Tel (612) 776-2210 Fax (612) 776-7201



RICHARD C. INGBERG

LTPP Regional Engineer

Date: December 30, 1993
To: Monte Symons, FHWA *RG*
From: Richard C. Ingberg, Regional Engineer
Re: SPS-1 and 9 in Thayer County, NE
Materials Sampling and Testing Plan

Attached is one copy of the materials sampling and testing plans for the above referenced projects. We have reviewed the plans for these projects, which appear to meet all requirements. We recommend that they be approved.

Please call if you have any questions.

Encl:

cc: Gene Skok, Braun Intertec (w/o Encl:)
George Woolstrum, Nebraska Department of Roads (w/o Encl:)

12" ATB/4" PATB
DRAINS
10484+00-10489+00

7" AC
8" ATB/4" PATB
DRAINS
10475+50-10480+50

7" AC
12" DGAB
10469+50-10474+50

7" AC
4" PATB/4" DGAB
DRAINS
10463+50-10468+50

7" AC
4" ATB/4" DGAB
10457+50-10462+50

7" AC
8" ATB
10450+00-10455+00

4" AC
4" PATB/12" DGAB
DRAINS
10444+00-10449+00

4" AC
4" PATB/8" DGAB
DRAINS
10438+00-10443+00

4" AC
8" ATB/4" DGAB
10429+50-10434+50

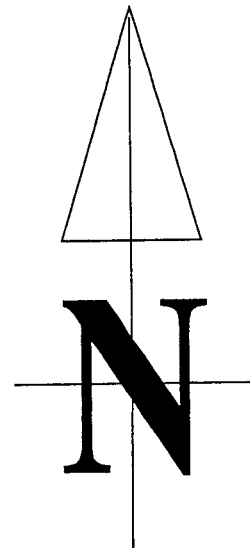
4" AC
12" ATB
422+00-427+00

4" AC
4" ATB/4" PATB
DRAINS
415+50-420+50

4" AC
8" DGAB
408+50-413+50

SPS-09
389+50-402+00

SPS-1
THAYER COUNTY, NE
US-81 SOUTHBOUND



NOT TO SCALE

UPDATED 12/30/93
G\USERS\SHP\MAPS\SPS\SPS1_NE

Section No.

Sampling and
Field Testing
Locations

	13		22		16		18		20		21
	■ B10	T49 + + + T50					T37 T39 + + + T38	■ B11	T43 T45 + + + T44		T40 T42 + + + T41

Section No.

Sampling and
Field Testing
Locations

	15		17		19		14		23		24
			T52 T54 + + + T53	■ B12	T46 T48 + + + T47		T55 T57 + + + T56				

LEGEND

- + Location of field testing (T37 through T57)
- Location of bulk sampling of DGAB (B10 - B12)

Prep. Sg. - Prepared Subgrade
PATB - Permeable Asphalt Treated Base
DGAB - Dense Graded Aggregate Base

Sampling and Testing Locations for DGAB

Section No.	13		22		16		18		20		21	
Sampling and Field Testing Locations			T64 T66 + + + T65		T58 T60 + + + T59		T61 T63 + + + T62					

Section No.	15		17		19		14		23		24	
Sampling and Field Testing Locations	T73 T75 + + + T74		T76 T78 + + + T77						T70 T72 + + + T71		T67 T69 + + + T68	

LEGEND

+ Location of field testing (T58 through T78)

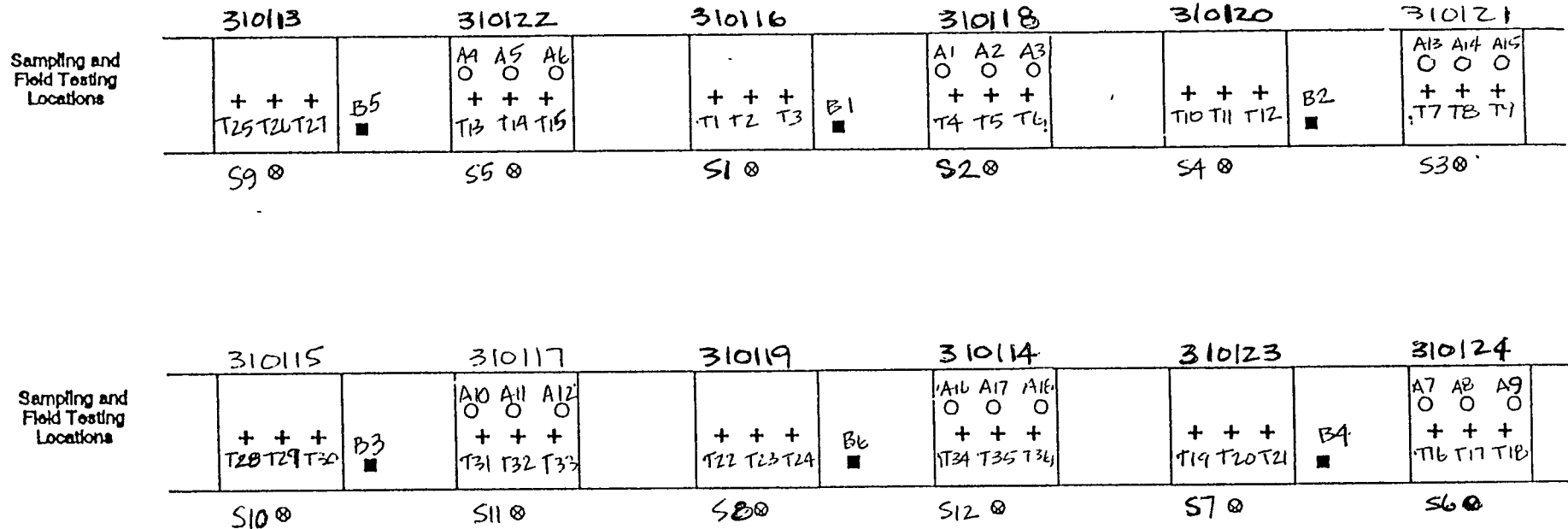
Prep. Sg. - Prepared Subgrade

PATB - Permeable Asphalt Treated Base

DGAB - Dense Graded Aggregate Base

ATB - Asphalt Treated Base

Testing Locations for ATB



- 2 x 2 bulk sampling location (B1 - B6) to 12" below top of subgrade
- Shelby tube/split spoon sampling to 4' below top of subgrade (A1 - A18)
- ⊗ Shoulder probe (S1 - S12)
- + Location of field testing (T1 - T36)

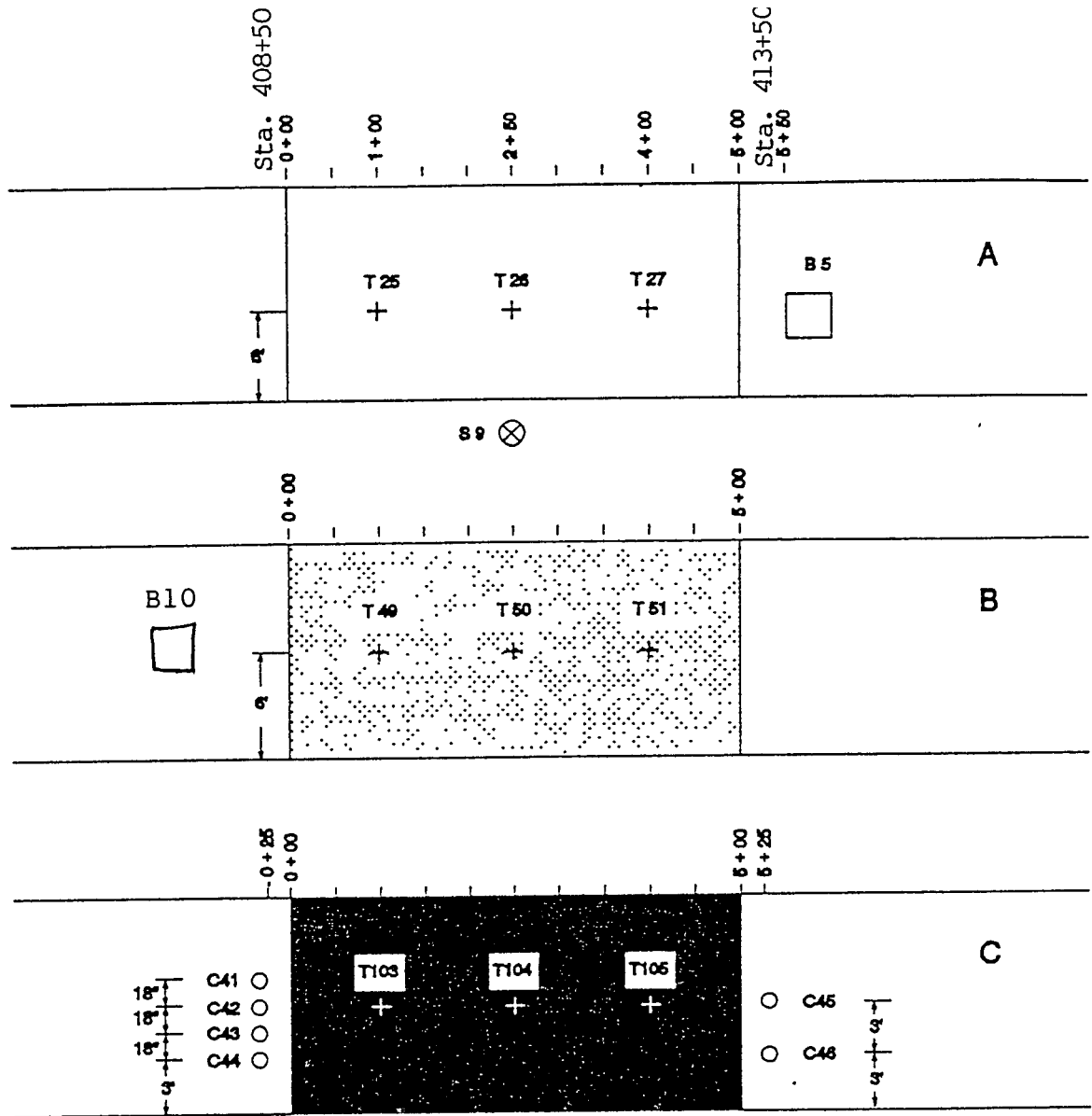
Subgrade Sampling and Testing Plan

Pavement Structure

Prep. Sg.

DGAB
Prep. Sg.

AC
DGAB
Prep. Sg.



- A Testing on prepared Subgrade (T25 - T27, B 5 , S9)
- B Testing on compacted DGAB (T49 - T51)
- C Testing on finished AC Surface (T103 - T105)
- Coring AC Surface only (C41 - C46)

Section 310113
Sta. 408+50 to 413+50

Pavement Structure

Prep. Sq.

PATB
Prep. Sq.

ATB
PATB
Prep. Sq.

AC
ATB
PATB
Prep. Sq.

Sta. 415+50
-0+00

1+00

2+00

4+00

Sta. 420+50
-5+00
-6+00

8'
8'

A4

+

T13

A5

+

T14

A6

+

T15

A

S5

0+00

5+00

B

-0+35
0+00

5+00
5+35

T64

+

T65

+

T66

+

C

-0+25
0+00

5+00
5+25

T91

+

T92

+

T93

+

D

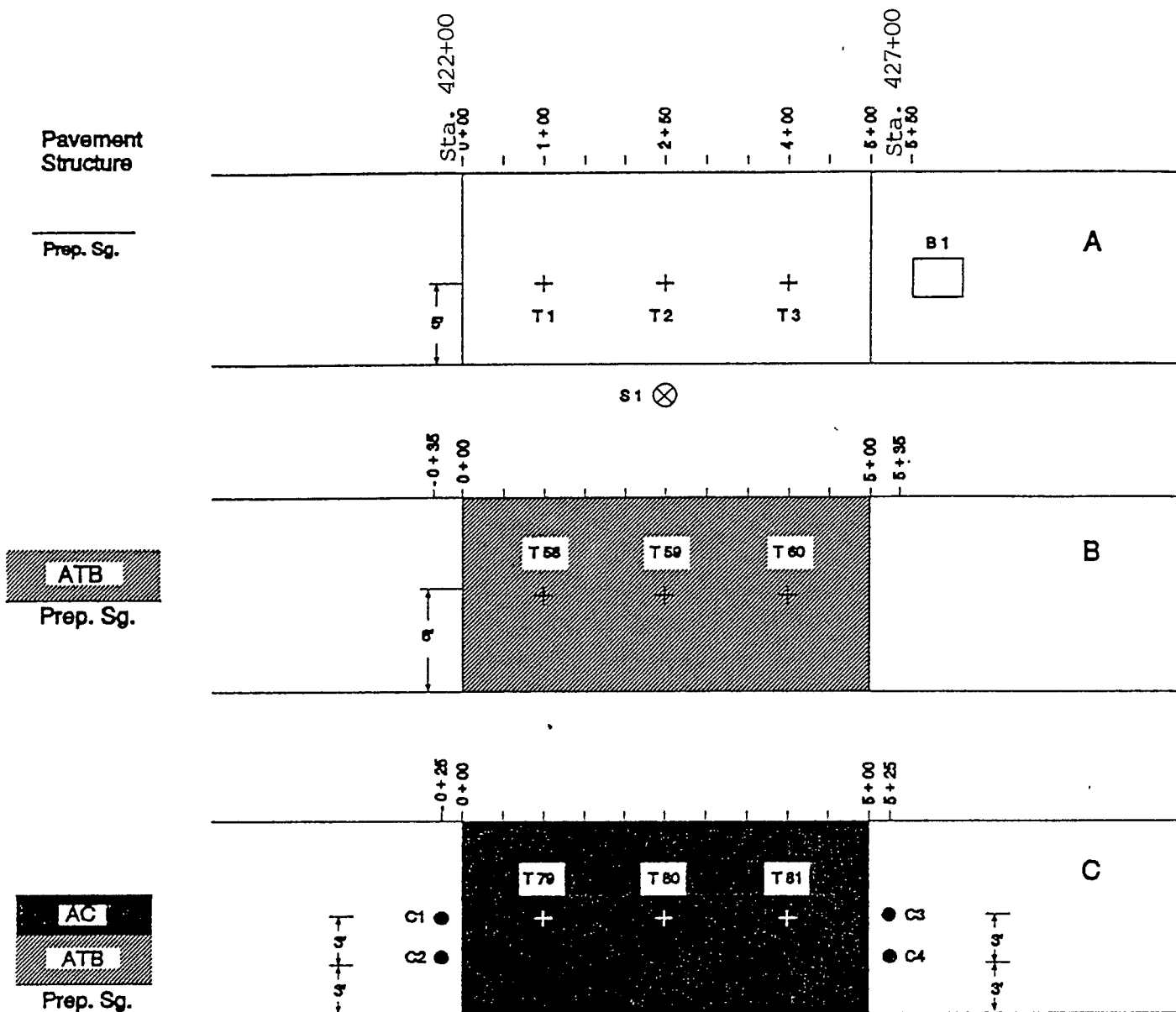
C21

C22

C23

C24

- A Testing on prepared Subgrade (T13 - T15, B 3, S5)
- B No testing on compacted PATB
- C Testing on compacted ATB (T64 - T66)
- D Testing on finished AC Surface (T91 - T93)
Coring AC Surface and bound layers (C21 - C24)



- A Testing on prepared Subgrade (T1 - T3, B 1 , S1)
- B Testing on compacted ATB (T58 - T60)
- C Testing on finished AC Surface (T79 - T81)
- Coring AC Surface and bound layers (C1 - C4)

Section 310116
Sta. 422+00 to 427+00

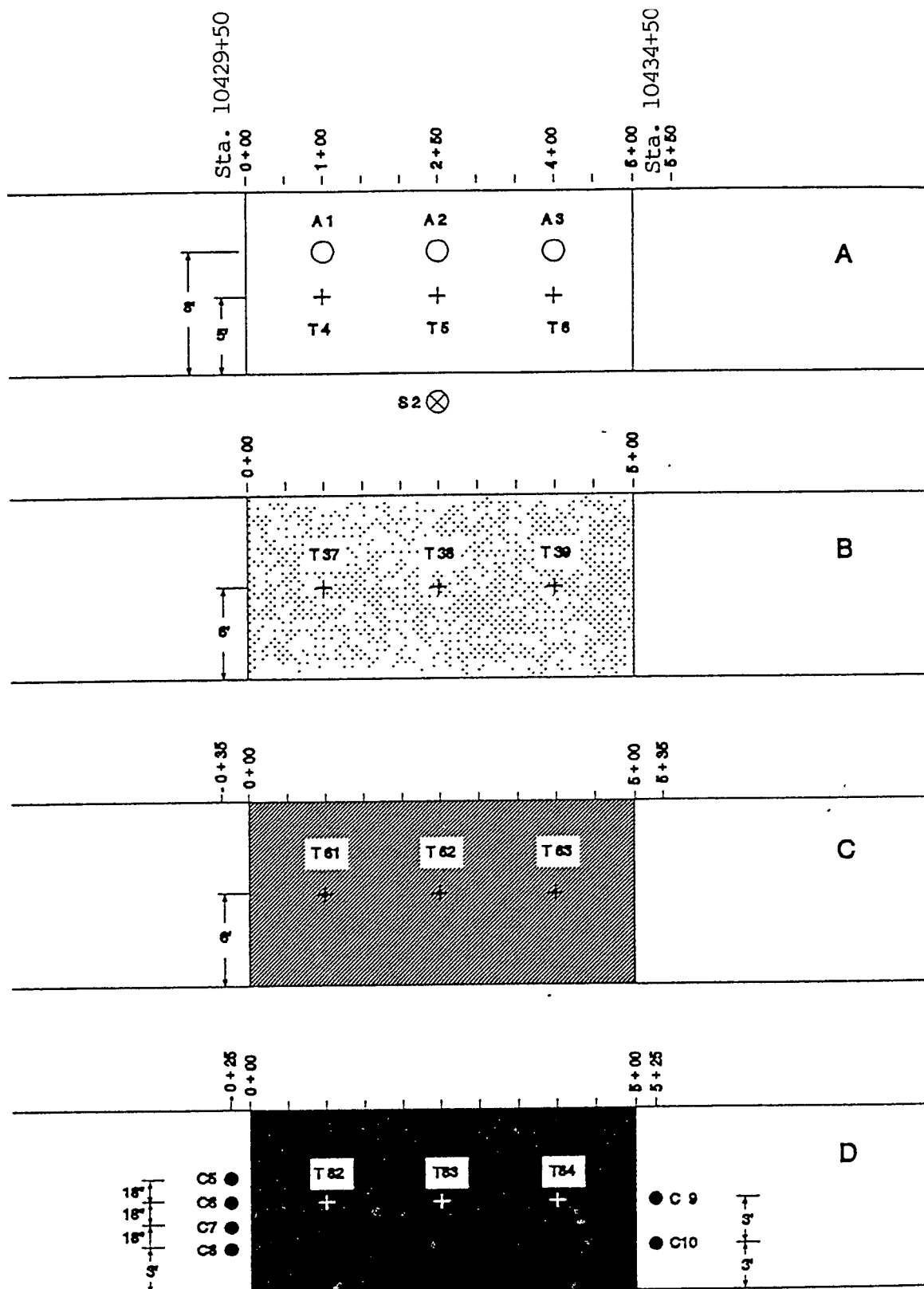
Pavement
Structure

Prep. Sp.

DGAB
Prep. Sp.

ATB
DGAB
Prep. Sp.

AC
ATB
DGAB
Prep. Sp.



- A Testing on prepared Subgrade (T4 - T6, A1 - A3, S2)
- B Testing on compacted DGAB (T37 - T39)
- C Testing on compacted ATB (T61 - T63)
- D Testing on finished AC Surface (T82 - T84)
- Coring AC Surface and bound layers (C5 - C10)

Section 310118
Sta. 10429+50 to 10434+50

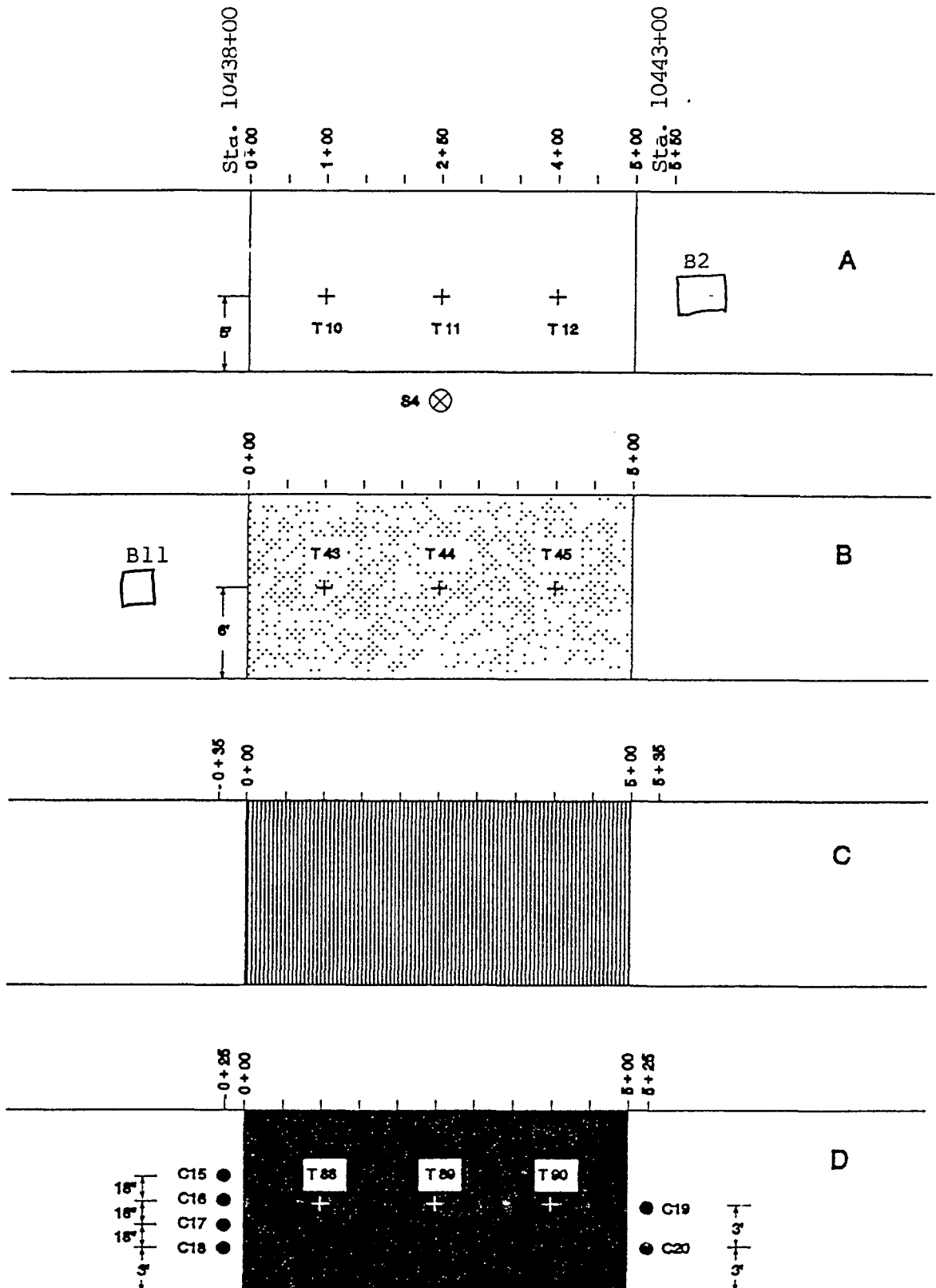
Pavement Structure

Prep. Sp.

DGAB
Prep. Sp.

PATB
DGAB
Prep. Sp.

AC
PATB
DGAB
Prep. Sp.



- A Testing on prepared Subgrade (T10 - T12, A4 - A6, S4)
- B Testing on compacted DGAB (T43 - T45)
- C No testing on compacted PATB
- D Testing on finished AC Surface (T88 - T90)
Coring AC Surface and bound layers (C15 - C20)

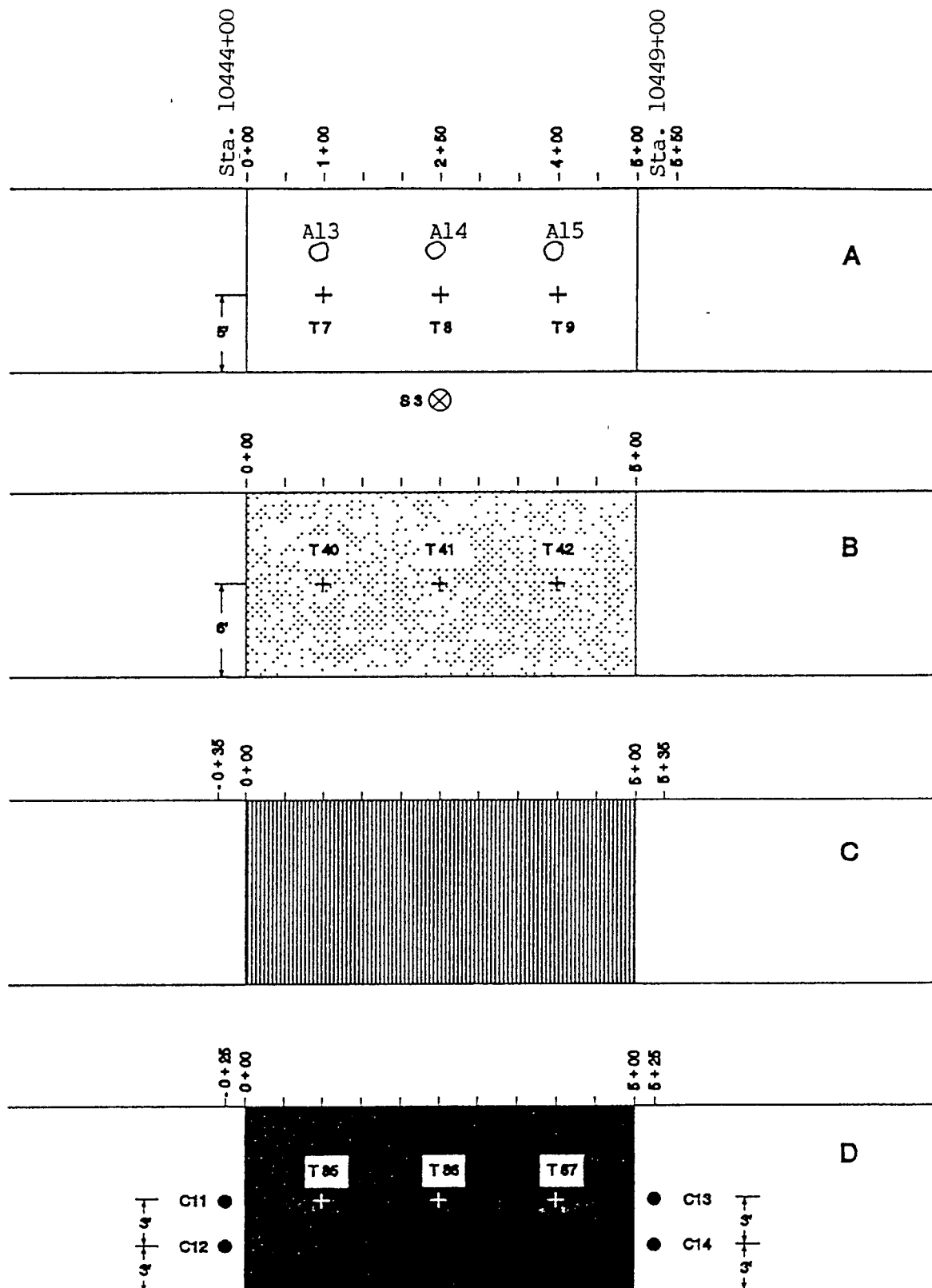
Pavement
Structure

Prep. Sp.

DGAB
Prep. Sp.

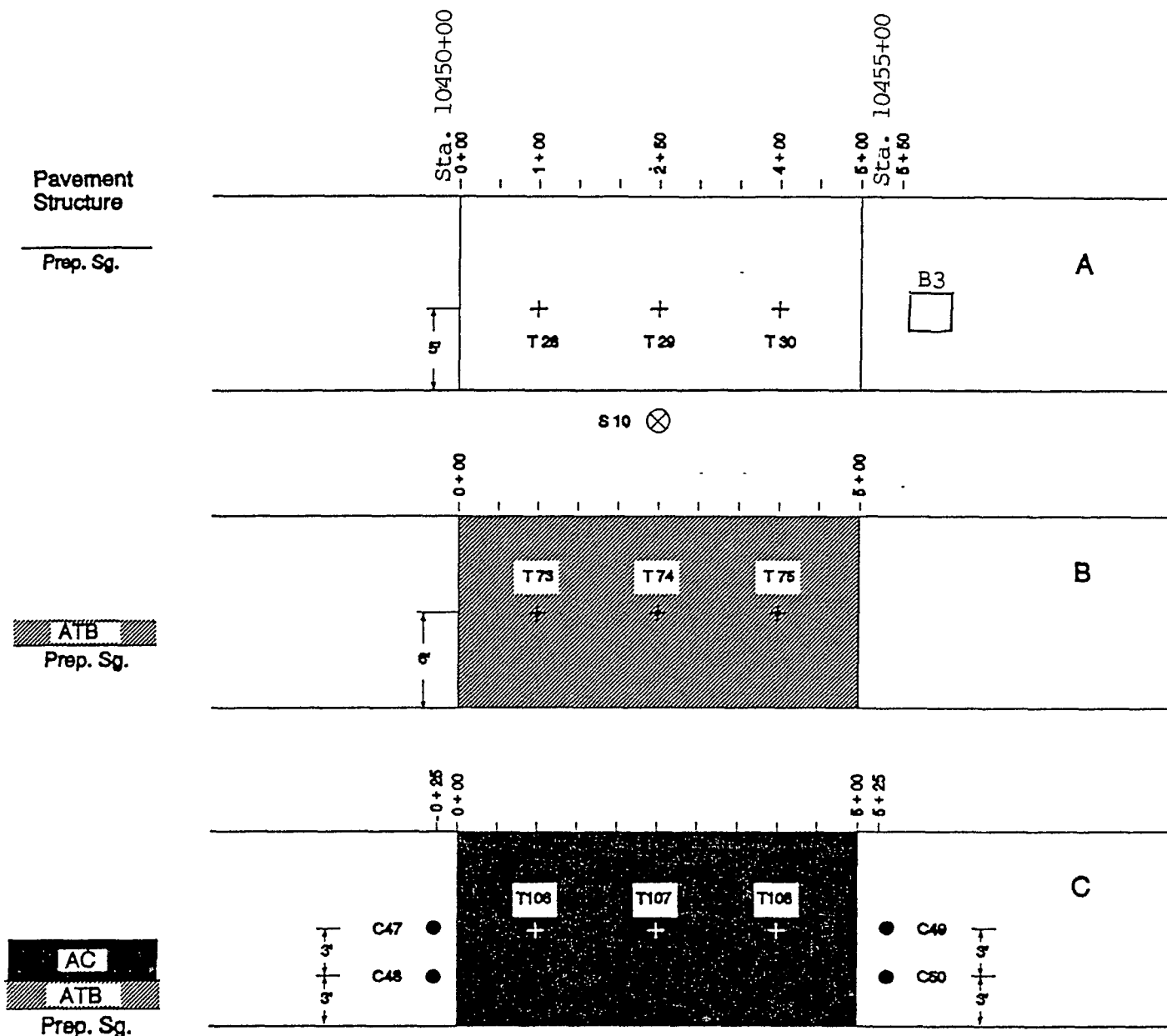
PATB
DGAB
Prep. Sp.

AC
PATB
DGAB
Prep. Sp.



- A Testing on prepared Subgrade (T7 - T9, ~~B-2~~, S3)
- B Testing on compacted DGAB (T40 - T42)
- C No Testing on compacted PATB
- D Testing on finished AC Surface (T85 - T87)
Coring AC surface and bound layers (C11 - C14)

Section 310121
Sta. 10444+00 to 10449+00



- A Testing on prepared Subgrade (T28 - T30, A 13 - A 15 , S10)
- B Testing on compacted ATB (T73 - T75)
- C Testing on finished AC Surface (T106 - T108)
- Coring AC Surface and bound layers (C47 - C50)

Section 310115
Sta. 10450+00 to 10455+00

Pavement
Structure

Prep. Sp.

DGAB
Prep. Sp.

ATB
DGAB
Prep. Sp.

AC
ATB
DGAB
Prep. Sp.

Sta. 10457+50

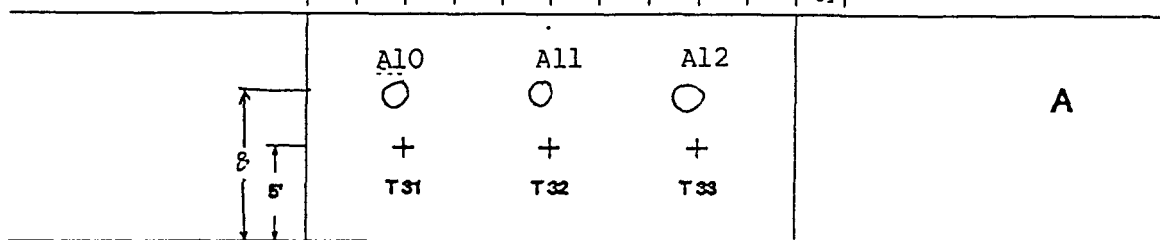
1+00

2+00

4+00

Sta. 10462+50

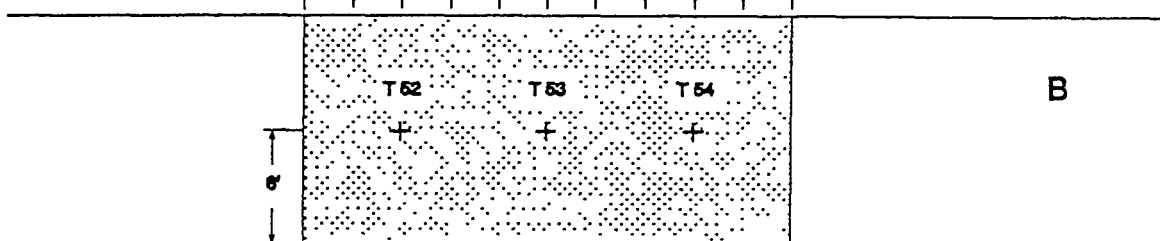
6+00



S11 ⊗

0+00

6+00

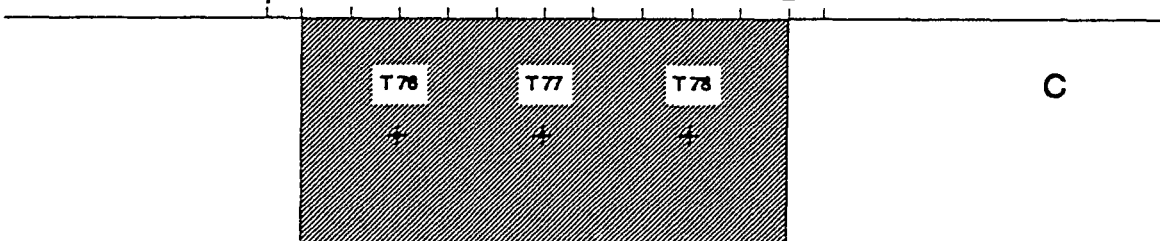


0+35

0+00

6+00

6+35

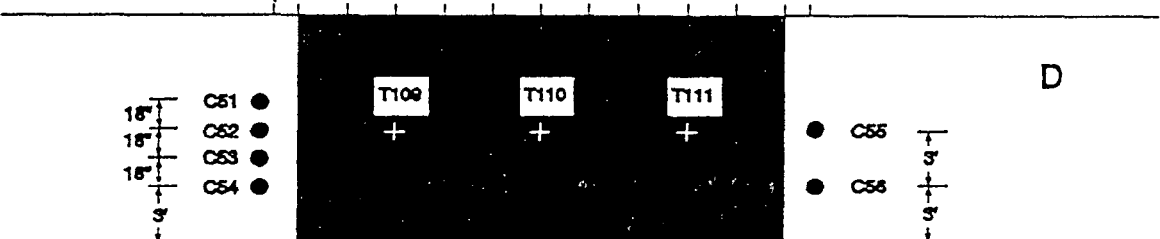


0+25

0+00

6+00

6+25



- A Testing on prepared Subgrade (T31 - T33, B 6 , S11)
- B Testing on compacted DGAB (T52 - T54)
- C Testing on compacted ATB (T76 - T78)
- D Testing on finished AC Surface (T109 - T111)
- Coring AC Surface and bound layers (C51 - C56)

Section 310117

Station 10457+50 to 10462+50

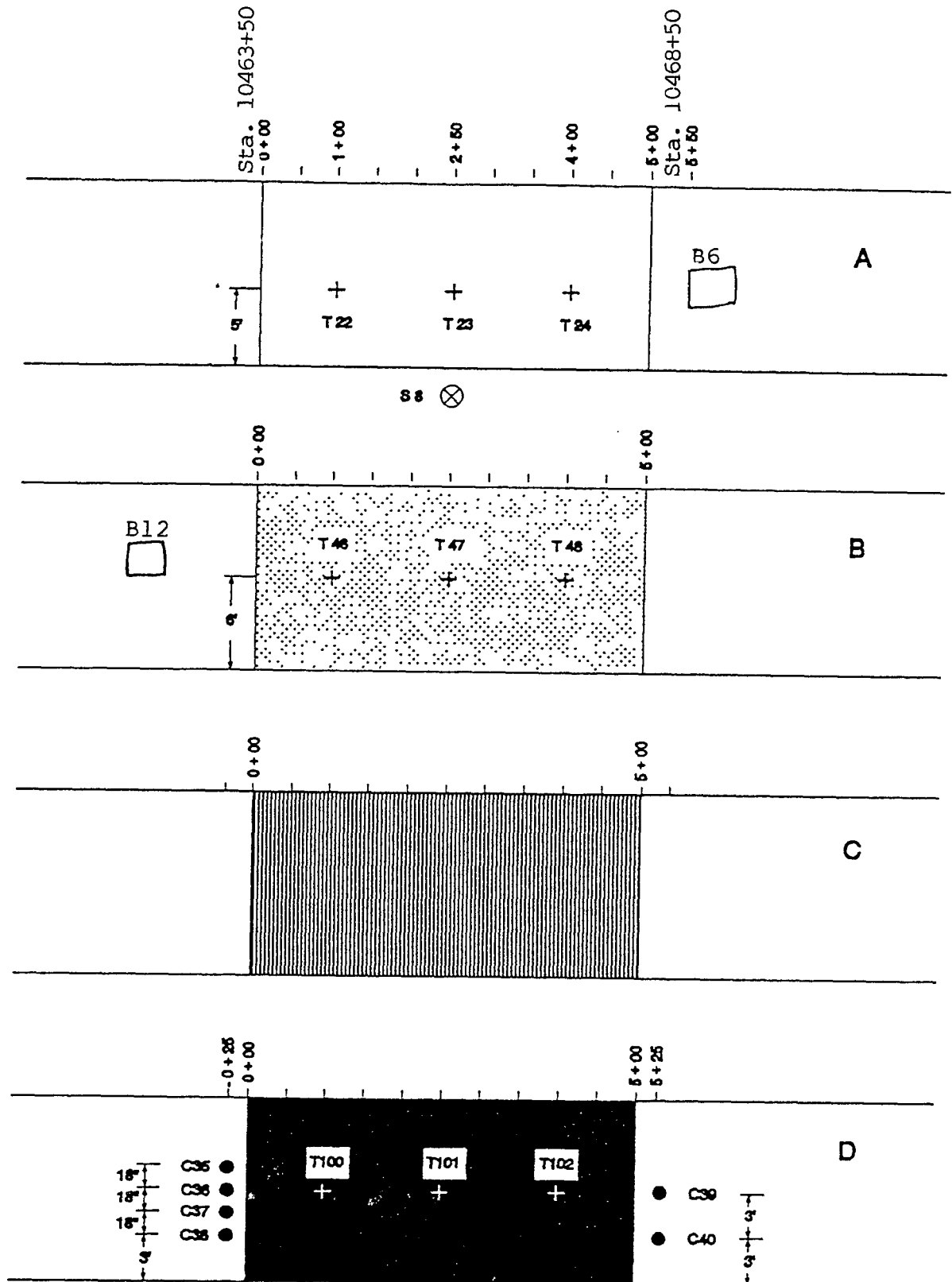
Pavement
Structure

Prep. Sp.

DGAB
Prep. Sp.

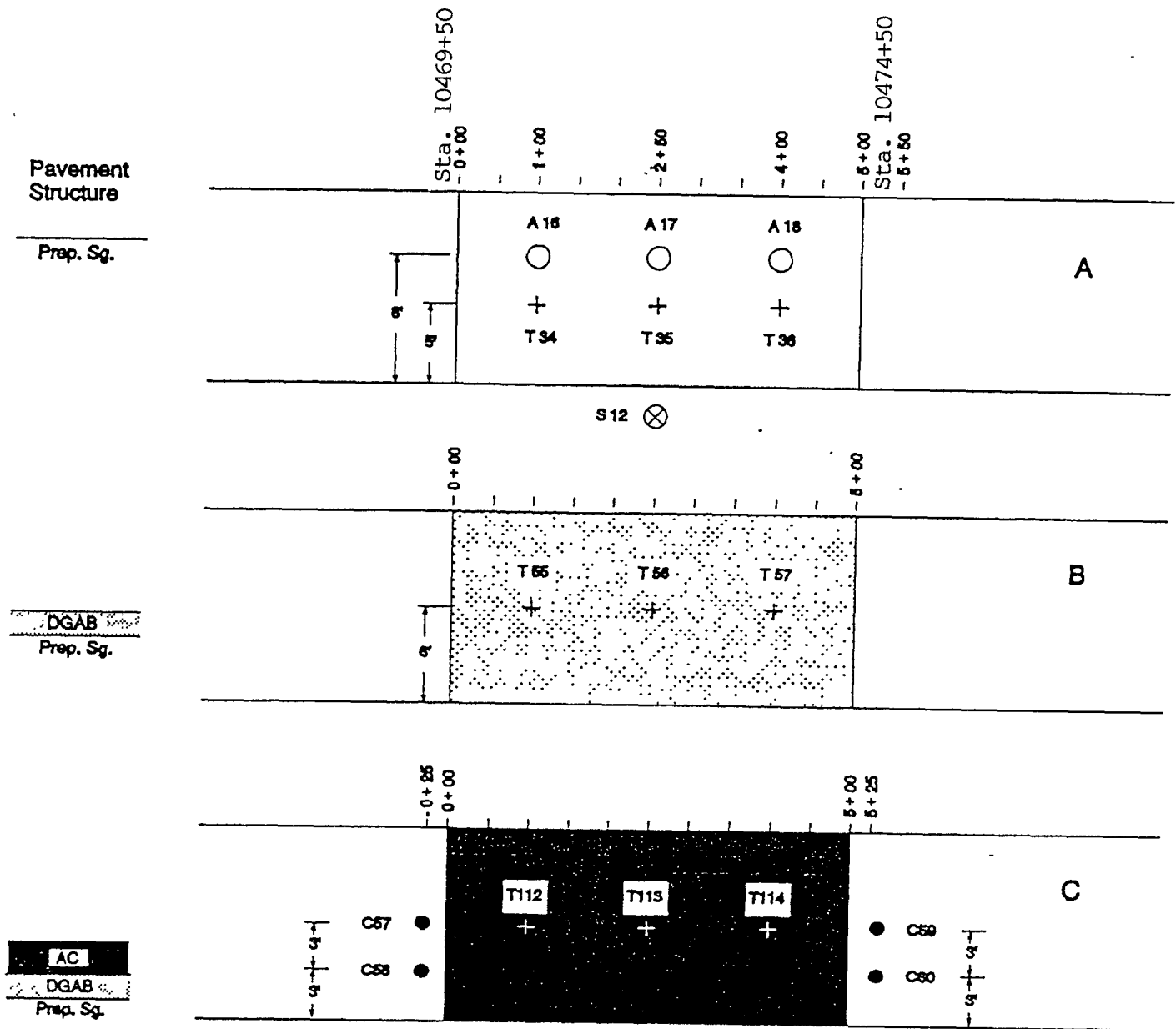
PATB
DGAB
Prep. Sp.

AC
PATB
DGAB
Prep. Sp.



- A Testing on prepared Subgrade (T22 - T24, A10 - A12, S8)
- B Testing on compacted DGAB (T46 - T48)
- C No testing on compacted PATB
- D Testing on finished AC Surface (T100 - T102)
- Coring AC Surface and bound layers (C35 - C40)

Section 310119
Sta. 10463+50 to 10468+50



- A Testing on prepared Subgrade (T34 - T36, A16 - A18 , S12)
- B Testing on compacted DGAB (T55 - T57)
- C Testing on finished AC Surface (T112 - T114)
- Coring AC Surface and bound layers (C57 - C60)

Section 310114
Sta. 10469+50 to 10474+50

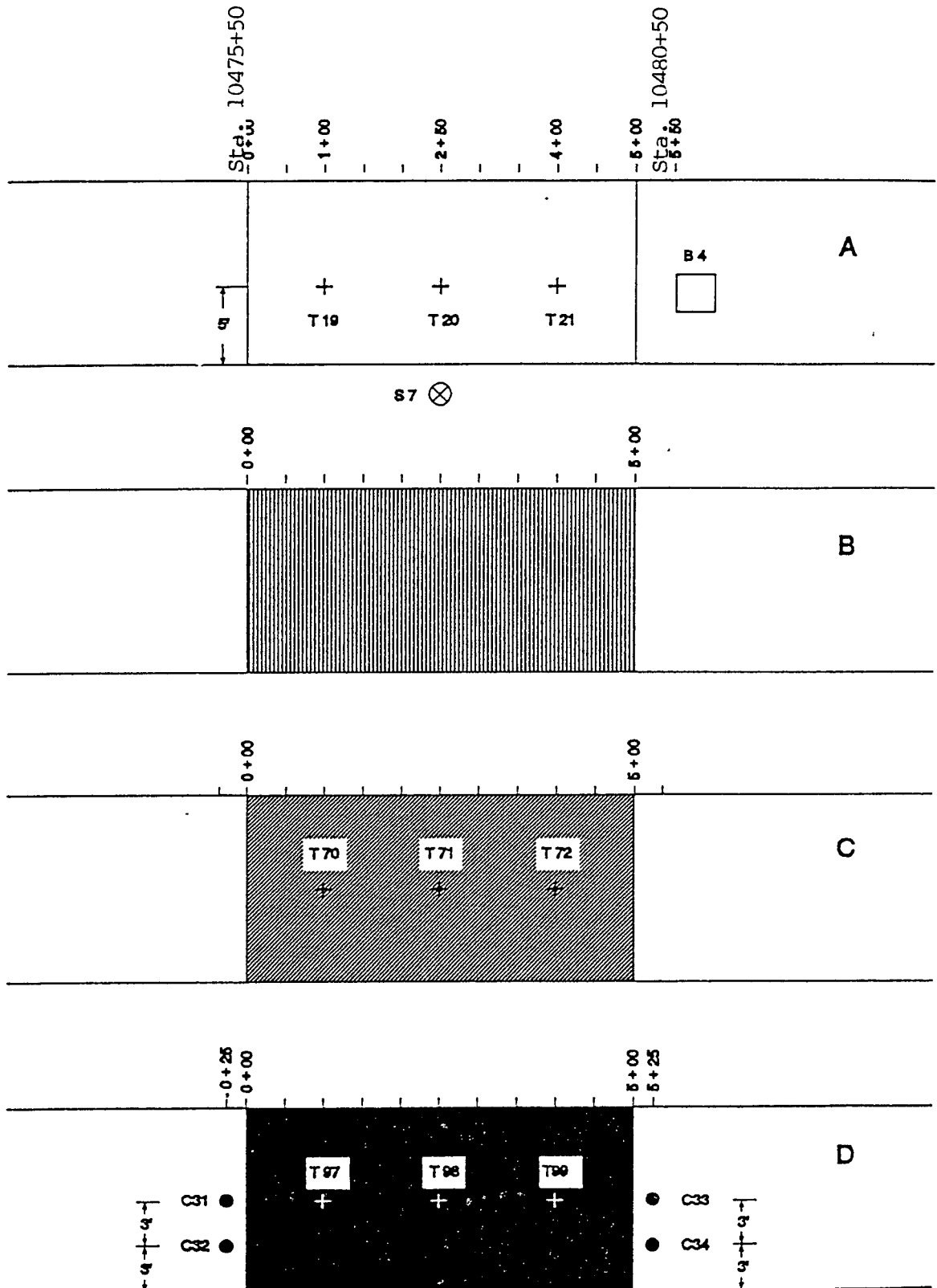
**Pavement
Structure**

Prep. Sq.

PATB
Prep. Sq.

ATB
PATB
Prep. Sq.

AC
ATB
PATB
Prep. Sq.



- A Testing on prepared Subgrade (T19 - T21, B4, S7)
- B No testing on compacted PATB
- C Testing on compacted ATB (T70 - T72)
- D Testing on finished AC Surface (T97 - T99)
- Coring AC Surface and bound layers (C31 - C34)

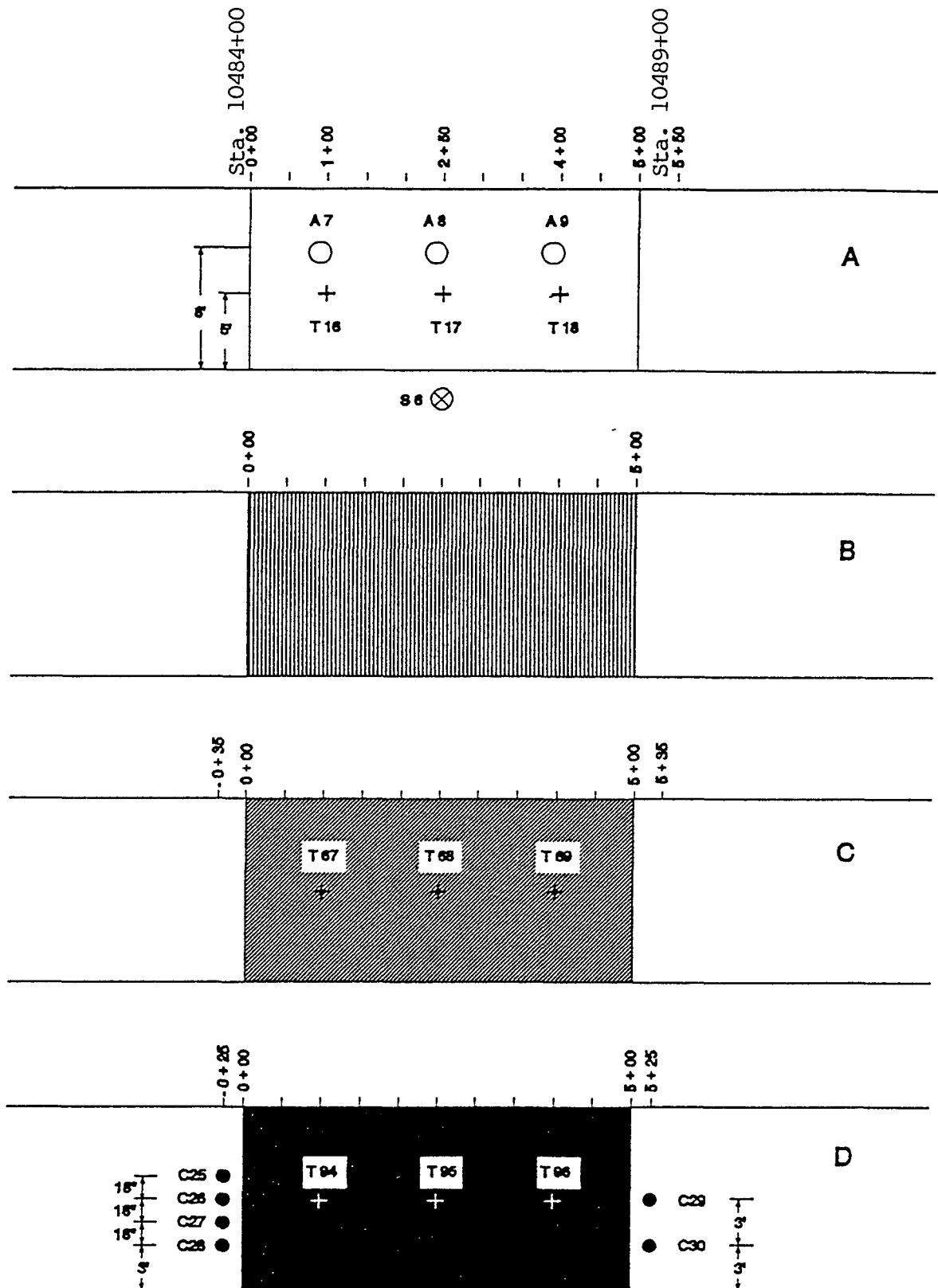
Pavement
Structure

Prep. Sg.

PATB
Prep. Sg.

ATB
PATB
Prep. Sg.

AC
ATB
PATB
Prep. Sg.



- A Testing on prepared Subgrade (T16 - T18, A7 - A9, S6)
- B No testing on compacted PATB
- C Testing on compacted ATB (T67 - T69)
- D Testing on finished AC Surface (T94 - T96)
- Coring AC Surface and bound layers (C25 - 30)

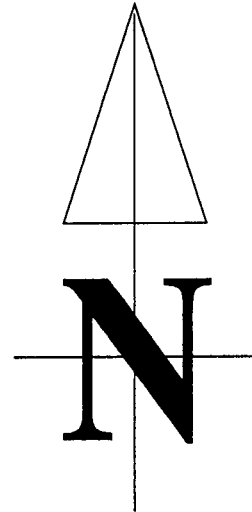
**SPS-9
THAYER COUNTY, NE
US-81 SOUTHBOUND**

**SPS-1 SECTIONS
408+50-10489+00**

310903
SMA MIX
7" AC, 12" GB
402+00-407+00

310901
NE MIX
7" AC, 12" GB
396+00-401+00

310902
SUPERPAVE
7" AC, 12" GB
389+50-394+50



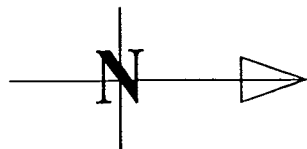
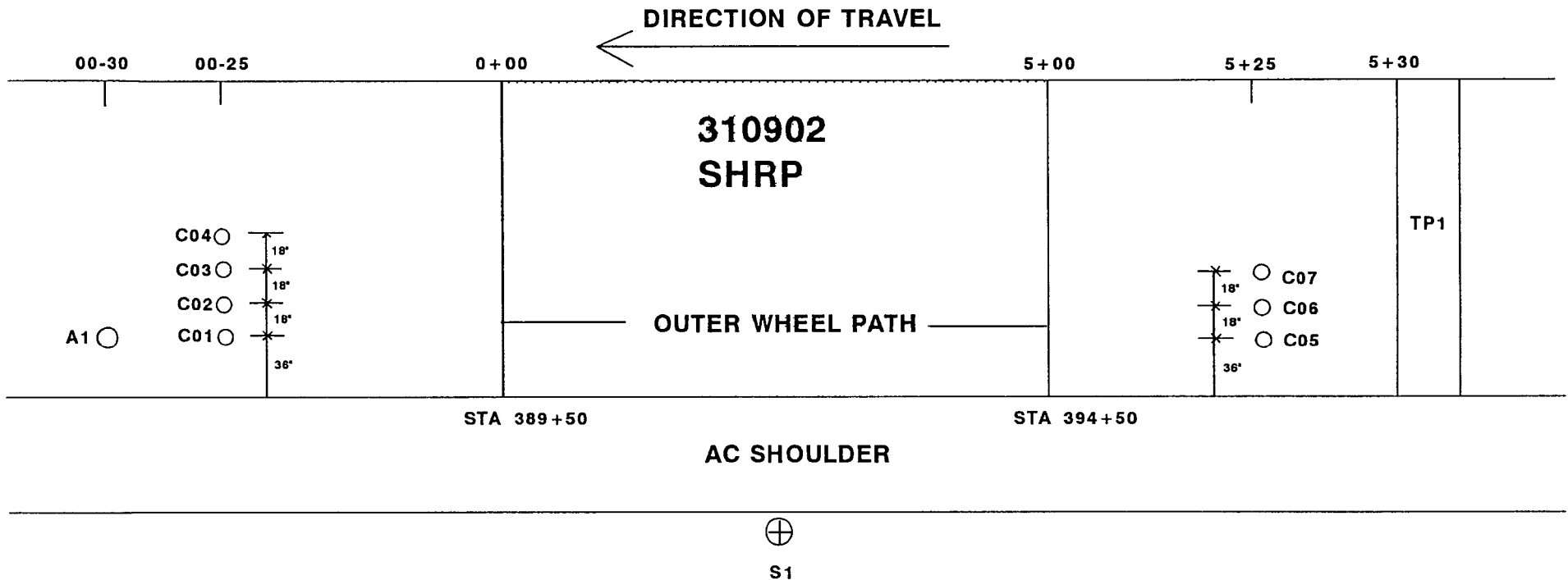
NOT TO SCALE

UPDATED ON 10/13/93

G:\USERS\SHPI\MAPS\SPS\SPS9_NE

PRE-CONSTRUCTION SAMPLING AND TESTING

SPS-9 THAYER COUNTY, NE US-81 SOUTHBOUND

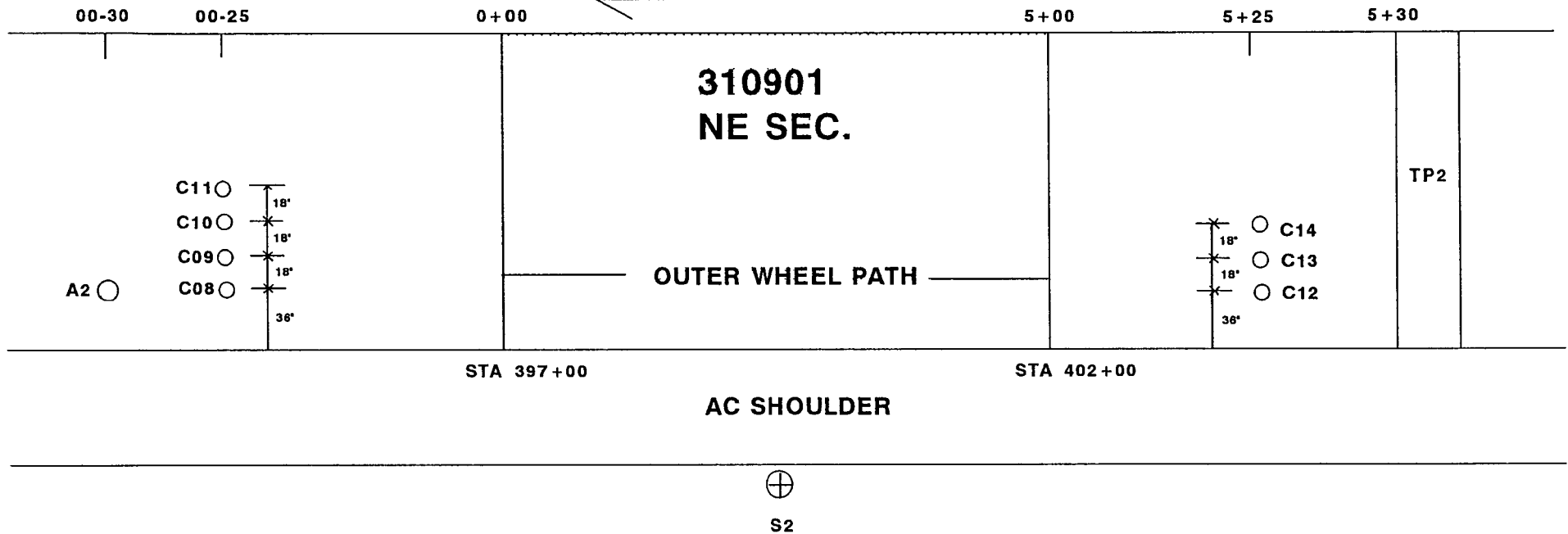


- 4" OD CORE OF SURFACE AND UNDERLAIN BOUND BASE.
- 6" OD CORE OF SURFACE AND UNDERLAIN BOUND LAYER
THIN-WALLED TUBE AND/OR SPLITSPOON SAMPLING 4' BELOW TOP OF
SUBGRADE.
- ⊕ SHOULDER PROBE 20' BELOW TOP OF SHOULDER
- ▭ TEST PIT TO OBTAIN NUCLEAR DENSITY AND BULK SAMPLES.

PRE-CONSTRUCTION SAMPLING AND TESTING

SPS-9 THAYER COUNTY, NE US-81 SOUTHBOUND

DIRECTION OF TRAVEL

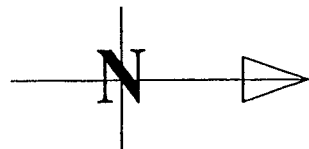


- 4" OD CORE OF SURFACE AND UNDERLAIN BOUND BASE.
- 6" OD CORE OF SURFACE AND UNDERLAIN BOUND LAYER
THIN-WALLED TUBE AND/OR SPLITSPOON SAMPLING 4' BELOW TOP OF
SUBGRADE.

- ⊕ SHOULDER PROBE 20' BELOW TOP OF SHOULDER



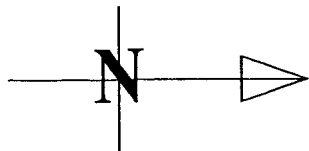
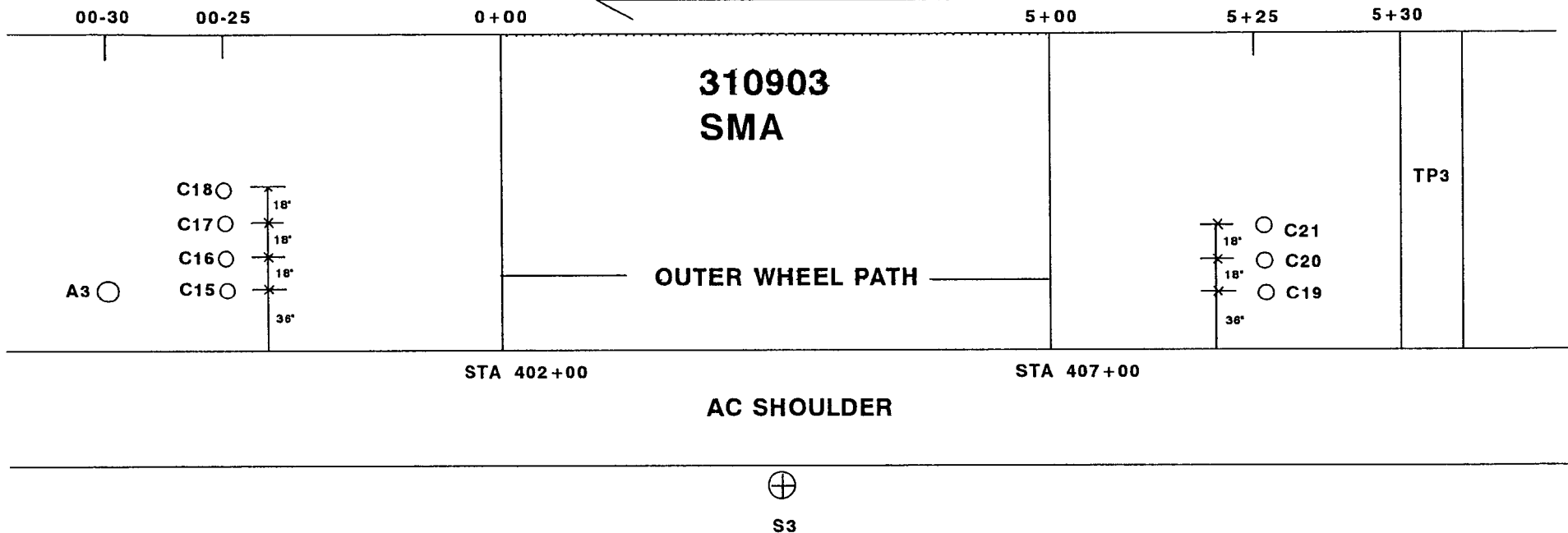
TEST PIT TO OBTAIN NUCLEAR DENSITY AND BULK SAMPLES.







PRE-CONSTRUCTION SAMPLING AND TESTING

SPS-9 THAYER COUNTY, NE US-81 SOUTHBOUND

DIRECTION OF TRAVEL



-  4" OD CORE OF SURFACE AND UNDERLAIN BOUND BASE.
-  6" OD CORE OF SURFACE AND UNDERLAIN BOUND LAYER
THIN-WALLED TUBE AND/OR SPLITSPOON SAMPLING 4' BELOW TOP OF
SUBGRADE.
-  SHOULDER PROBE 20' BELOW TOP OF SHOULDER
-  TEST PIT TO OBTAIN NUCLEAR DENSITY AND BULK SAMPLES.



LONG TERM PAVEMENT PERFORMANCE

North Central Region

1983 Sloan Place, Suite 10, St. Paul, MN 55117
Tel (612) 776-2210 Fax (612) 776-7201



RICHARD C. INGBERG
LTPP Regional Engineer

Date: February 4, 1994
To: Monte Symons, FHWA
From: Richard C. Ingberg
Re: Project Specifications
SPS-1 and 9 in Thayer County, Nebraska

We have reviewed the specifications for the above referenced projects. Attached are our comments. The specifications appear to meet all requirements, and we are forwarding them to you for your review.

Please call if you have any questions.

cc: John Miller, PCS Law
Ann Johnson, Braun Intertec

FACSIMILE COVER SHEET
NEBRASKA DEPARTMENT OF ROADS

201100

TRANSMIT TO

DATE 3 Jan 94
FAX # (612) 776-7201
NAME Ann Johnson
COMPANY Braun Inter tec
DIVISION _____
SECTION _____
ROOM _____
CITY _____
PHONE (____) ____-____
PAGES SENT 11 (INCLUDE THIS PAGE)

TRANSMITTED FROM

FAX # (402) 479-3975
NAME George Woolstrom
COMPANY Nebr DOR
DIVISION _____
SECTION _____
ROOM _____
CITY _____
PHONE (____) ____-____

NOTE:

These are the special provisions for the SPS-1
and the SPS-9.
Let me know what you think.

Nebraska
Department of Roads

SPS-9

Test pavements for this experiment are built as part of a new asphalt roadway. The locations, design, quantities, and requirements for these test pavements shall conform to SPS-1, the 1985 Standard Specifications, these Special Provisions, and as specified on the plans.

GENERAL REQUIREMENTS

Section 500 in the 1985 Standard Specifications is amended to include the following.

The following requirements apply to the test sections at each test site regardless of the pavement type.

Construction Requirements

Paragraph 4.b.(1) of Subsection 507.07 is amended to provide that the asphalt concrete thickness shall not exceed 3-inches per lift. ✓

The asphalt concrete mix shall be placed only after the contractor has satisfactorily demonstrated proper placement and compaction procedures on the Trial Compaction Area. The following section from station 402+00 to station 408+00 on this project can be used for a non-test location. ✓

Transverse construction joints are not allowed within the test sections. ✓

Section 500 in the 1985 Standard Specifications is amended to include that the as-compacted average thickness of the asphalt concrete in the test sections shall be constructed to within +/- 1/4-inch of the average thickness of the other test sections at the site. ✓

ASPHALTIC CONCRETE, TYPE SPS-9

Section 1007 in the Standard Specifications is amended to include Asphaltic Concrete, Type SPS-9 and to provide that this material shall conform to the requirements of Section 1007 as amended by these Special Provisions.

Mineral Filler

Subsection 1016.03 of the Supplemental Specifications is void and superseded with the following:

Mineral filler for use in asphaltic concrete shall be limestone dust. Soil type mineral filler, fly-ash mineral filler or limestone

dust which is produced as a by-product of sugar beet refining, will not be permitted. ✓

Limestone dust mineral filler shall consist of pulverized limestone that conforms to the following requirements:

	MIN.	MAX.
Total Percent Passing on No. 50 Sieve	95	100
Total Percent Passing on No. 200 Sieve	80	100
Plasticity Index (material passing the No. 200 sieve)	0	3

Aggregate

Definition of Aggregate Fractions

Coarse Aggregate	Retained on the 2.36 mm (No. 8) sieve
Fine Aggregate	Passing the 2.36 mm (No. 8) sieve
Mineral Filler	Passing the 75 um (No. 200) sieve

Coarse aggregate angularity is defined as the percent by weight of the aggregate particles larger than the 4.75 mm (No. 4) sieve with one or more fractured faces, on the portion of blended aggregate. All asphaltic concrete shall contain coarse aggregates with at least 75 percent containing one fractured face.

Fine aggregate angularity is defined as the percent air voids present in loosely compacted aggregate that passes the 2.36 mm (No. 8) sieve. All asphaltic concrete shall contain fine aggregates that have at least 40 percent air voids.

Fine aggregate angularity is measured on the fine aggregate portion of the blended aggregate by National Aggregates Association Test Method A. The results of this test are used in the laboratory during the mix design process, but not as a field control tool to monitor aggregate production.

The term "thin, elongated particles" is defined as the percentage by weight of coarse aggregate which have a ratio of maximum to minimum dimensions greater than five (5).

The percentage of thin, elongated particles is measured on the portion of the blended aggregate retained on the 4.75 mm (No. 4) sieve by ASTM Standard Method of Test D 4791. The maximum percent by weight of elongated particles allowed is 10 percent.

A minimum result of 45 is required on the AASHTO T176 sand equivalent test. ✓

Dust proportion is defined as the ratio of the percent by weight of aggregate passing the 75 um (No. 200) sieve to the effective

asphalt binder content expressed as percent by weight of the total mix. The dust proportion ratio for use in SPS-9 shall be 0.6 to 1.2.

a. The combined mineral aggregate for Asphaltic Concrete, Type SPS-9 shall be an aggregate or a combination of aggregates, and mineral filler if needed. The gradation of the individual components shall be such that a job mix formula meeting the target value requirements shown below, can be established. The maximum percentage of limestone permitted in the design mix shall be 60, this percentage is for skid resistance purposes.

RANGE FOR TARGET VALUES

SIEVE SIZE	PERCENT PASSING	
	Min	Max
No. 10	26.0	32.0
No. 50	10.0	14.0
* No. 200	5.0	7.0

- * This requirement is based on a specific gravity range of 2.55 to 2.75 for the material passing the No. 200 sieve. For specific gravities outside the limits shown, the range may be adjusted by the Materials and Test Engineer to maintain an equivalent volume of material passing the No. 200 sieve.

In addition to the above requirements, the gradation of the combined mineral aggregate proposed for use shall have 100% passing the 1-inch sieve, 98% or more passing the 3/4-inch sieve, 91% to 99% passing the 1/2-inch sieve, 73% to 81% passing the 3/8-inch sieve, and 39% to 47% passing the No. 4 sieve and the plasticity index of the portion of the combined mineral aggregate passing the No. 200 sieve of the materials submitted for experimental bituminous mixtures shall not exceed 6 for approval of the mixture design.

Asphalt Binders

The use of a modified asphalt binder in the Asphaltic Concrete, Type SPS-9 may be required. The need for a modifier may become evident at any of the stages in the mix design process. ✓

The modifier used in the Asphaltic Concrete, Type SPS-9 shall be paid for on an as needed contingency basis. ✓

SPS-1

STRATEGIC HIGHWAY RESEARCH PROGRAM (SHRP) TEST SECTIONS

This project includes the construction of SHRP test sections. The locations, design, quantities, and requirements for the SHRP test sections are specified on the plans and this special provision.

Sections for transition from SHRP test sections to standard pavement sections are identified on the plans. The locations, design, and requirements of these transition sections are specified on the plans.

The SHRP sections and transition sections shall be constructed in accordance with the Standard Specifications, except when modified in this special provision and the plans.

The special backfill, base courses, treated drainage layers, and surface courses in the SHRP test sections shall be constructed using virgin materials. No recycled asphalt pavement (RAP) or recycled existing PCC pavement shall be used in constructing the SHRP test sections. ✓

Nuclear gauge testing and additional coring of the dense graded asphalt treated base (DGATB), permeable asphalt treated base (PATB), and the asphaltic concrete, type 4 constructed in the SHRP test sections will be performed by others. Bulk sampling of asphalt cement and uncompacted (PATB), (DGATB) and asphaltic concrete, type 4 used in the SHRP test sections will be performed by others. The contractor shall coordinate with the Engineer for sampling on the SHRP test sections. ✓

EARTHWORK PREPARATION AND COMPACTION OF SUBGRADE

Embankment and subgrade soils shall be prepared according to the 1985 Nebraska Standard Specifications and the following requirements:

Paragraph 4.e. of Subsection 204.03 in the 1985 Standard Specifications is amended to provide that the existing roadbed shall be scarified to a depth of 12 inches and recompact to the requirements for type of compaction shown on the plans, when there is less than 3 feet of embankment constructed on any part of an existing stone or gravel surfaced roadbed or driveway. ✓

Paragraph 4.f. of Subsection 204.03 in the 1985 Standard Specifications is amended to provide that when embankments are to be constructed over cultivated or fallowed land, the entire area upon which embankment is to be constructed shall be compacted according to the requirements shown on the plans, before any embankment material is placed. ✓

Paragraph 1.a. of Subsection 301.03 in the 1985 Standard Specifications is amended to provide for uniformity of subgrade which

will consist of rolling the subgrade with a heavy pneumatic tire roller (25 to 30 tons) with tire pressure at 100 psi or more. The purpose being to identify unstable areas in the subgrade. Ruts of two inch depth or more shall be judged to indicate an area of instability requiring additional work or replacement. Proof rolling shall not be done until the Engineer and the contractor agree that the subgrade is ready and is within 0.3 feet of the required plan elevation.

Test Roll
du

Paragraph 3.b (1) of Subsection 301.03 in the 1985 Standard Specifications is amended to provide that surface irregularities shall not exceed 1/4 inch between two points longitudinally or transversely using a 10-foot straightedge. Finished subgrade elevations shall not vary from design by more than 0.04 feet based on a rod and level survey readings taken at a minimum of 5 locations (edge, outer wheel path, inside edge of lane, mid lane and inside wheel path) at longitudinal intervals not greater than 50 feet.

✓

DENSE GRADED AGGREGATE BASE

Section 300 in the 1985 Standard Specifications is amended to include the following.

The dense graded aggregate base (DGAB) is an untreated material which conforms to the base material requirements and construction guidelines for this aggregate material are presented in the following sections.

Aggregate Requirements

The quality and gradation for the aggregate required in the construction in the dense graded aggregate base (DGAB) shall conform to the 1985 Standard Specifications with the following requirements.

SIEVE SIZE	PERCENT PASSING	
	Min.	Max.
1 1/2-inch	95	100 ✓
No. 4	20	50 ✓
No. 30	0	13
No. 200	0	8 ✓

Of the particles retained on the 3/8-inch sieve at least 75% shall have 2 or more fracture faces as stipulated in ASTM D 2940.

✓

The fraction passing No. 40 sieve shall have a liquid limit not greater than 25 and plasticity index not greater than 4.

✓

No additives, other than water, are allowed in the dense graded aggregate base.

✓

Construction Requirements

The base course shall be prepared to grade according to Section 300 in the 1985 Standard Specifications and the following requirements.

Thickness of compacted lift must not be greater than 8 inches. ✓

The surface shall be swept before priming taking care not to dislodge aggregate. ✓

Section 300 in the 1985 Standard Specifications is amended to include that surface irregularities shall not exceed 1/4-inch between two points longitudinally or transversely using a 10-foot straightedge. ✓

Section 300 in the 1985 Standard Specifications is amended to include that finished DGAB elevations shall not vary from design by more than 0.04 feet based on a rod and level survey readings taken at a minimum of 5 locations (edge, outer wheel path, midlane, inner wheel path, and inside edge of lane) at longitudinal intervals no greater than 50 feet. ✓

Paragraph 1.b of Subsection 306.06 in the Standard Specifications is amended to include that the DGAB course shall be compacted to a minimum requirement of 95 percent ^{relative} density. ←

After the DGAB has been compacted and trimmed, a prime coat shall be applied in accordance with the requirements of Section 501 in the Standard Specifications.

DENSE GRADED ASPHALT TREATED BASE

Section 500 in the 1985 Standard Specifications is amended to include the following.

Material and construction requirements for the dense graded asphalt treated base (DGATB) are presented in the following sections.

Material Requirements

Section 500 in the 1985 Standard Specifications is amended to include that the aggregate requirements for DGATB shall be the same as those for the DGAB. The DGATB shall be a dense graded, hot laid, central plant mix, asphalt treated material.

The mixture shall be designed to the equivalent of the following minimum mix design specifications:

Marshall

Compaction blow	50	✓
Flow	8-20	✓
Stability	1000 lb	✓
Air Void	3-5%	✓

Construction Requirements

Section 500 in the 1985 Standard Specifications is amended to include the following.

Placement requirements for the DGATB shall be similar to that used for hot mix asphaltic concrete surface courses and shall also include the following:

Thickness of the compacted lifts shall be limited to a maximum of 8 inches first lift and 4 inches for the subsequent lifts. ✓

Compaction of the first lift shall be an average of 94% of Marshall density or 90% of Maximum Theoretical Density. Subsequent lifts shall be compacted to an average of 96% of Marshall density or 92% of Maximum Theoretical Density. ✓

Surface irregularities shall not exceed 1/4 inch between two points longitudinally or transversely using a 10-foot straightedge.

Finished DGATB elevations shall not vary from design by more than 0.04 feet based on a rod and level survey readings taken at a minimum of 5 locations (edge, outer wheel path, midlane, inner wheel path, and inside edge of lane) at longitudinal intervals no greater than 50 feet. ✓

PERMEABLE ASPHALT TREATED BASE

Section 500 in the 1985 Standard Specifications is amended to include the following.

The Permeable Asphalt Treated Base (PATB) serves as a drainage layer in the pavement structure. Material and construction requirements for the PATB are presented in the following.

Material Requirements

PATB shall be an open graded, hot laid, central plant mixed, asphalt base material.

The quality and gradation for the aggregate required in the construction of the Permeable Asphalt Treated base (PATB) shall conform to the 1985 Standard Specifications and following requirements.

SIEVE SIZE	PERCENT PASSING	
	Min.	Max.
1 1/2-inch	100	
1-inch	95	100 ✓
1/2-inch	25	60 ✓
No. 4	0	10 ✓
No. 8	0	5 ✓
No. 200	0	2 ✓

*Densified
AC content
2 - 2.5%*

The aggregate shall consist of crushed material having more than 90% with at least one fracture face. ✓

Construction Requirements

Section 500 in the 1985 Standard Specifications is amended to include the following.

Construction requirements for the PATB include the following.

After placement, the mixture shall be thoroughly and uniformly compacted by a static steel wheel roller applying 0.5 to 1.0 tons per foot of roller width. Nuclear density gauges shall be used to establish a rolling pattern and determine the maximum density of the compacted mixture. ✓

The speed of the roller shall at all times be sufficiently slow to avoid displacement of the hot mixture. The rollers shall not travel faster than 3 mph. Any displacement occurring as a result of reversing the direction of the roller or from any other cause, shall be corrected. The roller shall not be permitted to stand static on the hot material. ✓

Surface irregularities shall not exceed 1/4 inch between two points longitudinally or transversely using a 10-foot straightedge. ✓

A track mounted paver shall be required ^{when paving on top of} on the permeable base. ✓

No traffic shall be allowed to operate or park on the travel lane or outside shoulder portion of the permeable base. Limited operation of equipment, e.g. delivery vehicles may be permitted on the inside edge. Any PATB which becomes loose, broken, mixed with dirt or in any way defective shall be removed and immediately replaced with fresh, hot material, as specified for the original. ✓

mixture and compacted to conform to specified lines and grades. Any replaced material shall be removed from the project and shall not be incorporated in the work in any form. All removal and replacement of damaged bituminous drainable base shall be done at no cost to NDOR.

FILTER FABRIC

The filter fabric to be used on this project must come from a list of approved types of filter fabric that is maintained by the Materials and Tests Division of the Nebraska Department of Roads.

The filter fabric must also meet AASHTO M288 standards for class A filter fabrics. ✓

Property	Minimum Value	Test Method
Grab Strength (lbs)	180 ✓	ASTM D 1682
Puncture Strength (lbs)	80 ✓	ASTM D 751
Trapezoid Tear (lbs)	50 ✓	ASTM D 4533
Burst Strength (lb/sq.in.)	290 ✓	ASTM D 3787
Equivalent Opening size US Std. Sieve (E.O.S.)	50-140 ✓	Corp of Eng. W-02215

The fabric must resist temperatures of a maximum 250 degree during placement of the PATB. ✓

Filter fabrics must be installed according to the manufacturer's specifications and as shown in the typical drawings. ✓

Exposure of the filter fabrics to the elements between lay down and cover shall not exceed 3 days. ✓

Any filter fabric which is ripped or torn during the construction process shall be replaced or repaired with a patch which extends 3 feet beyond the perimeter of the tear or damage. ✓

EDGE DRAINS

The backfill material for use in the edge drain trench, shall contain no asphalt and conform to the same aggregate gradation requirements as that used in the PATB, however an untreated open graded material of similar gradation may be used. ✓

✓
PATB
may be
used.

SHOULDERS

If full width paving is not possible then an operation must be used so that no longitudinal cold joint is present, except at the center line of the mainline roadway. ~~at the shoulder~~ ok

ASPHALTIC CONCRETE, TYPE 4

Asphaltic concrete, type 4 shall conform to the requirements described elsewhere in these Special Provisions. Asphaltic concrete, type 4 shall also include the following requirements.

A minimum result of 45 is required on the AASHTO T176 sand equivalent test. ✓

All transverse joints and construction joints shall be placed outside the test sections, e.g. within the transition zones between test sections. ✓

The as-compacted thickness of the asphalt concrete surface course in the test sections shall be constructed to within +/- 1/4-inch of the values specified in the experimental design. ✓

The asphalt concrete mix shall be placed only after the contractor has satisfactorily demonstrated proper placement and compaction procedures on non-test section locations. The following section from station 402+00 to station 408+00 on this project can be used for a non-test location. ✓

SPECIAL CONSIDERATIONS

The time from grading of a untreated layer to the placing of the treated layer or surface layer shall be minimized. If the surface is exposed to rain, the layer shall be dried to the design optimum moisture content and recompacted to specified density. Also, the entire test site, i.e. all test sections on the project, must be constructed in the same construction season. ✓

DEVIATIONS FROM GUIDELINES

Deviation from the guidelines described in the special provisions should be reviewed by the SHRP Regional Office or SHRP headquarters. SHRP will assess the implications of these deviations on the study objectives. If the implications of the non-compliance appear minimal, the deviations will be accepted, otherwise SHRP will suggest alternatives for consideration. ✓